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O. C. DURYEA

CAR CONSTRUCTION

Filed April 27, 1925

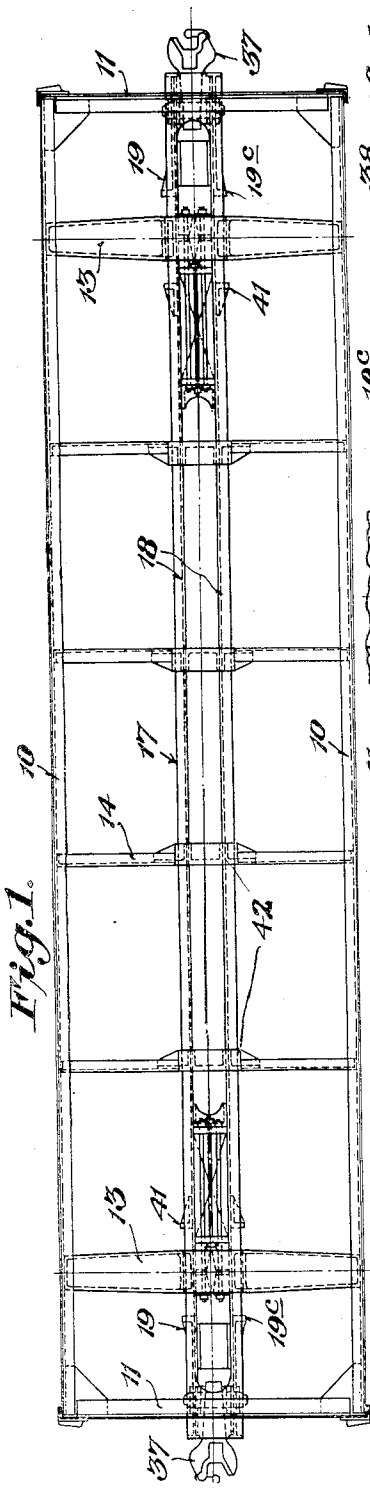


Fig. 1.

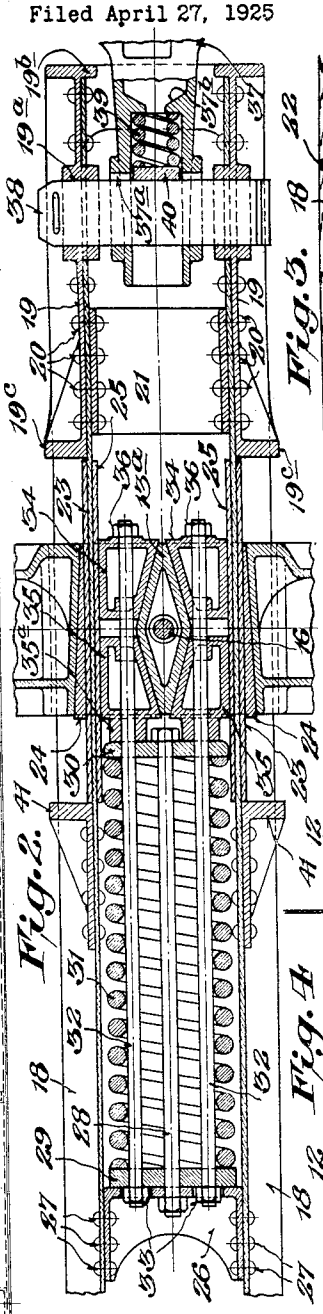


Fig. 2.

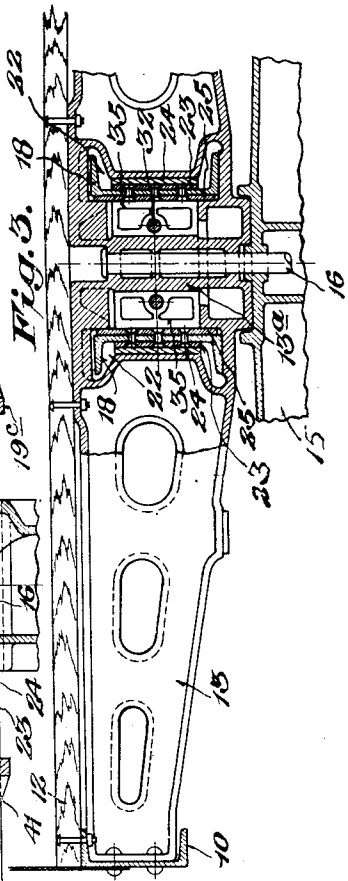


Fig. 3.

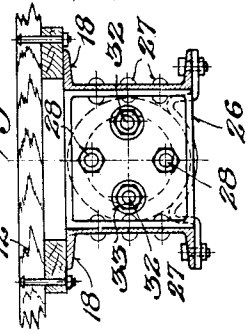


Fig. 4.

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UNITED STATES PATENT OFFICE.

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CAR CONSTRUCTION.

Application filed April 27, 1925. Serial No. 26,267.

This invention relates to railway rolling stock, and more particularly to a railway car embodying novel means for preventing the shocks and impact stresses incident to operating conditions from damaging the car structure or its lading.

In my application Serial No. 23,111, filed April 14, 1925, I have disclosed an improved car construction of the above type wherein the car body has limited longitudinal movement relative to the car trucks and running gear.

An object of the present invention is to provide a novel railway car which is so constructed that relative longitudinal movement is provided between a center member and the remainder of the car structure whereby forces, such for example as impact stresses due to "buffing", are gradually absorbed without damage to the car or lading.

Another object of the invention is to provide means of relatively great length of travel for yieldingly resisting relative longitudinal movement between the center member and the remainder of the car structure, said means being adapted to normally maintain the relatively movable parts in a predetermined position without any increase in the train slack.

A further object is to provide a car of the above character which is so constructed that the necessity for the usual draft gears of the types now employed is eliminated although certain advantages of the present invention may be secured if draft mechanism of any suitable or the usual type be employed and the ratio of the train slack to the travel of the energy dissipating means be maintained as will be set forth more fully hereafter.

Another object of the invention is to provide novel coupler means.

Further objects are to provide a car of this character which conforms closely to the construction at present employed in standard railway rolling stock; to decrease the weight or amount of metal employed in the car structure; to provide a construction whereby impact stresses, such as buffing shocks, are not thrown directly on rivets; to provide a construction wherein the slack between cars is not increased; and to provide a rugged structure which is inexpensive to manufacture.

One form which the inventive idea may assume is shown in the accompanying drawings, which drawings, however, are for the purpose of illustration only and are not to be taken as defining the limits of the invention, reference being had to the appended claims for this purpose.

In the drawings,

Fig. 1 is a top plan view illustrating one form of the present invention;

Fig. 2 is an enlarged detail plan view in section, illustrating one form of means for limiting relative longitudinal movement between the center member and the remainder of the car;

Fig. 3 is a transverse detail sectional view, somewhat enlarged, illustrating one form of bolster and center member construction;

Fig. 4 is a transverse detail view in section, illustrating one manner of connecting the resilient means to the center member.

Referring to the drawings wherein like reference characters refer to like parts throughout the several views, the car construction of the present invention may embody a body portion having side sills 10, end sills 11, and a flooring 12. In engagement with the side sills 10 are a plurality of transverse members which include body bolsters 13 and one or more cross bearers 14. Each body bolster is mounted on the usual truck bolster 15, partially shown in Figure 3, the connection between the body bolsters 13 and truck bolsters 15 being the usual type of center plate and king-pin 16.

Mounted for relative longitudinal movement with respect to the truck bolsters 15, and preferably with respect to the remainder of the car structure, is a long travel center member 17 which, in the form shown, includes a center sill that may be formed of two vertically disposed U-shaped channel members 18 and reinforcing members 19 that are secured in any suitable manner to the opposite ends of the center sill. Preferably the reinforcing members, which will be referred to hereafter as draft sills, are formed of castings provided with shouldered openings 19^a, with end shoulders 19^b constituting a striking plate, and with rear shoulders 19^c for a purpose to be described hereinafter. The castings 19 are rigidly attached to the center sill as by means of rivets 20, the ends of the channel members 18 of the center sill preferably having abutting engagement with the shoulders 19^b, whereby any thrust on the draft sills is not thrown directly on said rivets 20. Any suitable means, such as tie plates 21,

may be employed for strengthening and bracing the channel members 18 constituting the center member.

In order that damage may not result to the car or its lading from impact stresses, such as are produced when buffing a car, or when rapidly changing its speed of movement, the center member 17, as above stated, is mounted for longitudinal movement relative to certain of the transverse members, as for example the bolsters 13, and means are provided for yieldingly resisting relative movement between the center member and said transverse members whereby the forces tending to cause damage are gradually absorbed. In the form shown, body bolsters 13 are each provided with a pair of adjacent openings 22 centrally thereof, and as shown in Figure 2, each of said bolsters is preferably provided with a vertically disposed portion 13^a which is substantially diamond-shaped in cross section, and which constitutes a center partition for the two openings 22 surrounding the king-pin 16. This portion 13^a strengthens the body bolster 13. Secured to the channel members 18 in the planes of the bolsters, and extending a suitable distance on the opposite sides of the latter, are wear plates 23 which have engagement on the outer faces of the same with suitable wear plates secured to bolsters 13, such for example as the substantially wedge-shaped plates 24 interposed between said wear plates and the side wall of the opening 22 in the bolster. Similar wear plates 25 may be secured to the inner surface of each of the channel members 18 opposite the outer plates 23.

Yielding means of any suitable type are provided for yieldingly resisting longitudinal movement of the center member relative to the transverse members, said means being preferably combined with friction elements, for example, means for positively producing friction between the wear plates 23 and the wedge-shaped plates 24, which latter may be fixedly secured in any suitable manner to the bolsters 13 as by means of welding. In the form shown a casting 26 is secured, as by means of rivets 27, to the channel members 18, at a suitable distance from the bolsters 13, and through this member 26, extends one or more rods 28 on which are slidably mounted adjacent the opposite ends thereof, follower plates 29 and 30 which are engaged by the opposite ends of a coil spring 31. Mounted for slidable movement through the casting 26 are a pair of rods 32 provided at the inner ends thereof with nuts 33 which are normally in engagement with the follower plate 29 and which carry on the opposite ends thereof a plurality of friction shoes 34, 35. The follower plates 29, 30 and the rods 28, 32 constitute a yoke for the spring 31. The outer pair of friction shoes 34 are held in position on said rods 32 by means of nuts 36 and by engagement with the diamond-shaped portion 13^a of the bolster, said shoes being provided with inclined faces on the inner sides thereof, which faces are inclined at an angle similar to the sides of the diamond-shaped portion 13^a. The inner friction shoes 35 are also provided with inclined faces which engage two sides of the diamond-shaped portion 13^a and these shoes are provided with a longitudinally extending boss 35^a which normally has engagement with the outer face of follower plate 30.

Suitable coupler means are employed, but in the present instance the necessity for the usual draft gears is eliminated due to the use of the means previously described for yieldingly resisting relative movement of the center member 17. In the form shown a coupler shank 37 is secured for limited longitudinal movement relative to said center member by means of a coupler shank key 38 which extends through the shouldered openings 19^a in said draft sills. The movement of the coupler relative to the center member provides "slack" between the cars of a train. An opening 37^a is provided in the coupler shank of such size that limited movement is provided between said shank and said key 38. In engagement with shoulders 37^b, formed interiorly of the coupler shank, is a resilient member 39 which has engagement at its inner end with a wear plate 40 bearing against the side of the coupler shank key 38. Stops 41, if desired, may be secured to the channel members 18 adjacent the inner ends of wear plates 23, 25 for a purpose to be described hereinafter.

If desired, the center member 17 may be rigidly secured to the cross bearers 14 and the latter may have sliding engagement with the side sills 10, as is shown in my co-pending application Serial No. 23,111, referred to above, but preferably the ends of the cross bearers 14 are rigidly secured to side sills 10 and the center member is mounted for longitudinal movement relative to said cross bearers in any suitable manner, as for example in a manner similar to that shown in Figure 3, where the center member extends through openings in the transverse member.

As shown in Fig. 4, longitudinal stringers 43, which are preferably formed of wood, are interposed between the flooring 12 and the upper flanges of channels 18. Relative movement of the center member in either direction is yieldingly resisted by the friction between the contacting surfaces of stringers 43 and the flanges of channels 18, as is pointed out more fully in my copending application Serial No. 23,111, filed April 14, 1925. The friction resulting from the use of the stringers 43 varies with the weight of the lading carried on the flooring 12.

Operation.—Any force exerted on the car for placing it in motion, for changing its

rate of motion, or for coupling the same to another car, is received by the coupler-shank 37 and is transferred through key 38 to center member 17, and motion is thereby imparted to the latter. Because of the inertia of the remainder of the car structure, and the lading carried thereby, the center member receives longitudinal movement relative to the remainder of said structure, which relative movement acts through member 26 to produce a longitudinal movement of the rods 28 to the left for example, as viewed in Fig. 2, together with the follower plate 30, thereby compressing the spring 31. Resilient member 31 resists this compression and the same exerts a force on follower plate 29 tending to move said plate to the left. This tendency is resisted by nuts 33 on the inner ends of rods 32, which rods extend loosely through the follower plates 30, with the result that friction shoes 34 are drawn to the left thereby wedging said shoes between the diamond-shaped portion 13ª of the body bolster 13, and wear plates 25 secured to the channel members 18. This pressure on the wear plates 25 forces the wear plates 23 more closely into engagement with the wedge-shaped plates 24 and produces a large amount of friction between plates 24 and 23, which friction tends to yieldingly resist relative longitudinal movement of the center member, and to dissipate a large amount of the energy tending to produce the relative movement.

The resilient means and friction elements at the opposite ends of the car act simultaneously and in combination to resist relative movement between the center member and the car body regardless of the direction of relative movement of said center member.

If force is applied to the center member 17 tending to move the latter to the right, as viewed in Figure 2, this energy is transferred by the casting 26, rigidly secured to the center sill, to the follower plate 29 thereby tending to compress spring 31. The force of the spring 31 is exerted on follower plate 30 whereby the inner friction shoes 35 are forced outwardly into engagement with the wear plates 25 with a result similar to that described above. Shoulders 19ᶜ, formed on the inner ends of the draft sills 19, and members 41 constitute positive stops for limiting the relative movement of the center member 17 in either direction. The provision of stops 19ᶜ and 41 on the center member, which stops are adapted to engage the bolster 13, results in a structure which can not go solid within the meaning of the term as employed in the art, i. e., no part of the energy dissipating means 31, 34, 35 can go solid when highly stressed under a draft or buffing force, the relative movement of these elements being positively limited by said stops which are located at a distance from the energy dissipating means. The openings 37ª in the coupler shank are of such size that there is positive engagement of the edge of the key 38 with the wall of the opening before the coils of the spring 39 are forced into engagement one with the other, thereby preventing overloading of the spring. The coupler shank, however, goes solid on key 38 and a predetermined and invariable train slack is thus provided, which slack is preferably less than that resulting from the use of the short travel draft gears employed at present.

It will be understood that the length and size of the springs 31, or the inclination of the inner faces of the friction shoes 34, 35 and of the outer faces of the portion 13ª, or both, may be varied as desired to control the amount of relative movement between the center member and the transverse members. The extent of relative movement of the center member 17 may be relatively great without increasing the slack in the train line because the relative movement between the center member and the remainder of the car is not cumulative between adjacent cars. As a matter of fact, in the forms shown, this slack is less than that now considered standard the same being limited to the relative movement between the couplers and the center member.

It will be noted that the friction shoes have a much greater travel relative to the center member than to the bolster. In the event that this relative movement produces galling or seizing of the friction shoes, the resilient means at the opposite end of the car is sufficiently strong to return the center member to its normal position. As the latter moves to normal position, the seized shoe will move with the same and be withdrawn from engagement with the diamond-shaped portion 13ª of the bolster, whereupon the adjacent resilient member 31 acts through the follower plate 30 on the adhering shoe, in such a manner as to tilt or cant the shoe and thereby positively release the latter from its adherence with the center member. The friction shoes are thus positively released in the event of seizure. It is pointed out, however, that the capacity of the resilient means associated with the friction shoes is so great, and the friction surfaces are so large that, except under the most unusual conditions, there is no likelihood of the friction elements seizing.

The resilient means and friction elements employed adjacent the opposite ends of the center member act to yieldingly resist relative longitudinal movement of the center member in either direction. All forces and strains thrown on cars of the various types now in use, which forces and strains invariably result in damage if the same are excessive, are absorbed by a draft gear having a travel of approximately 2½ to 3 inches. By the use of the present invention the necessity for draft gears of the type now in use is elimi-

nated and the strains placed on the car structure are absorbed by a plurality of mechanisms which may have a travel two or three times as great as that of the usual draft gears if desired. Moreover, the travel of draft gears heretofore used cannot be increased in order to more effectively absorb the shocks incident to the usual operation because this would increase the slack of the train line. As pointed out above, by means of the present invention the slack of the train line may be decreased if desired.

The present invention includes new principles in car construction since, among others, it provides for a variation in the ratio of travel between the train slack means and the shock absorbing means. In devices heretofore employed, the train slack has been substantially equal to the draft gear travel (the ratio has been substantially unity), while in the present invention there is provided a different ratio, both as to travel and capacity, between the energy absorbing means and the train slack means, the former being increased relative to the latter. By the use of the present invention the switching speed may be greatly increased with safety, thus speeding up train operation. Since train slack can be reduced, longer trains can be safely handled and heavier cars may be constructed because of the large capacity of the energy dissipating means.

Due to the great amount of train slack in trains as now operated, cars are frequently derailed by an emergency application of the brakes, when the latter are applied intentionally or through a break in the air line. By the use of the present invention derailment of cars under the above conditions is eliminated, since this invention permits of a predetermined train slack, which slack may be relatively low, and at the same time permits relatively long travel shock absorbing means to be employed. A relatively small amount of train slack is desirable to prevent a combined and simultaneous effort of all cars, in a train, against starting or stopping.

In railway cars of the type now in use, the pulling force of the engine is exerted through yielding means, since said cars are provided with resilient members, or resilient and friction members, intermediate the couplers. When a train of these cars are in motion, dynamometer records show that said yielding means are continuously oscillating, and that a considerable amount of energy is thus lost. The present invention embodies means which substantially eliminates the loss of energy resulting from the continuous oscillation of the yielding means referred to above, since in the present structure the pulling force of the engine may, if desired, act through rigid connections throughout the train.

As shown in Fig. 2, when a number of cars embodying the present invention are coupled to form a train, the pulling force of the engine acts directly through coupler 37, key 38 and center member 17 of all the cars, no yielding means being interposed throughout the entire line of draft. Each car body is protected, however, by the yielding means such as is constituted by springs 31 and the friction elements referred to above.

It will be perceived that the structure of the present invention conforms closely to the standard construction at present employed. Since the draft sills may have abutting engagement with the center sill by means of the shoulders 19^b, and if desired by means of the shoulders surrounding the openings 19^a, substantially no shearing strain is placed on the rivets 20, which secure the draft sills to the center sill.

Heretofore an attempt has been made to prevent damage to the car structure by increasing the weight and strength of the center sill, draft sills, etc. This increase in weight and strength only increases the difficulty of preventing damage, since the overall weight of the car is correspondingly increased, and this results in an increase in forces to be absorbed. By the use of the present invention the weight of the structural elements of a car, for example the center sill and draft sills, may be materially decreased because of the manner in which the destructive forces are yieldingly resisted and absorbed.

Various changes may be made in the details of construction without departing from the spirit of the invention, as defined in the appended claims. For example, some advantages of the present invention may be obtained by associating draft gears with the couplers provided the movement of the coupler relative to the center member is maintained sufficiently limited and is less than the movement of the center member relative to the bolsters. Such an arrangement will not result in a predetermined train slack but long travel and low forces will still be secured.

What is claimed is:

1. In a railway car, a plurality of transverse supporting members, a center draft member extending substantially the length of the car and adapted for longitudinal movement relative to said supporting members, means including friction elements for resisting relative movement between said center member and said supporting members, and couplers having lost motion connection with the opposite ends of said center draft member, the movement of the couplers relative to the center member determining the train slack and being less than the movement of the center member relative to the supporting members.

2. A railway car comprising a plurality of transverse supporting members, a center draft member adapted for longitudinal move-

ment relative to said supporting members, couplers movably secured to the opposite ends of said center member, and means including resilient and friction elements for resisting relative movement of the center member in either direction, the movement of the couplers relative to the draft member determining the train slack and being less than the movement of the draft member relative to the supporting members.

3. In a railway car, two or more transverse members, a load supporting center sill mounted for longitudinal movement relative to a plurality of said transverse members, means including friction elements for yieldingly resisting relative movement of said first named means in either direction, and couplers having lost motion connection with the opposite ends of the center sill.

4. In a railway car, two or more transverse members, a load supporting center sill mounted for longitudinal movement relative to a plurality of said transverse members, means including a spring operatively engaging said sill and one of said transverse members, and one or more friction elements having operative engagement with said spring for resisting relative movement of said first named means, and couplers movably secured to the opposite ends of the center sill.

5. In a device of the class described, a plurality of transverse supporting members, a load supporting center sill mounted for longitudinal movement relative to said transverse members, said sill extending through one of said members, means actuated by relative movement of said sill for positively producing frictional engagement between said sill and the member through which the sill extends, and couplers movably keyed to the center sill.

6. A railway car comprising a plurality of transverse members, a load supporting center sill mounted for longitudinal movement relative to said members, said sill extending through one of said members, couplers having lost motion connection with the opposite ends of said center sill, and means including a resilient member and one or more friction elements for resisting relative movement of said first named means, the movement of the couplers relative to the center sill being materially less than the movement of the center sill relative to said transverse members.

7. In a railway car, a plurality of transverse members, two of said members constituting body bolsters, a load supporting center sill constituting a draft member and having engagement with said bolsters, means for normally maintaining said center sill and bolters in a predetermined relative position, said means including a spring and one or more friction shoes operatively connected to said spring, and couplers movably secured to the ends of the center sill.

8. A railway car comprising a plurality of transverse members, two of said members constituting body bolsters, a load supporting center sill extending through said bolsters, coupler means movably secured to said center sill, and yielding means for normally maintaining said center sill and bolsters in a predetermined relative position, said last named means including one or more resilient members operatively secured to said center sill, yokes for said resilient members, and friction shoes secured to said yokes, said shoes having engagement with said center sill and one of said bolsters.

9. A railway car comprising a plurality of transverse members, a load supporting center sill mounted for longitudinal movement relative to one or more of said transverse members, means for yieldingly resisting relative movement of said center sill, a coupling member for each end of said center sill, a key for securing each of said coupling members to said center sill, and means interposed between each key and coupler member for yieldingly resisting relative movement of the coupler member.

10. A railway car comprising a plurality of bolsters, a load supporting center sill mounted for longitudinal movement relative to said bolsters, means for yieldingly resisting relative movement of said center sill, couplers, means for movably securing said couplers to said center sill including resilient means for normally maintaining the couplers in a predetermined position relative to said center sill, the travel of the resilient means being materially less than the travel of said yielding means.

11. In a device of the class described, a plurality of transverse members, two of said members constituting body bolsters, a center sill mounted for movement relative to said bolsters, draft sills secured to the center sill and having shoulders in engagement with the end of said center sill, said draft sills constituting stops for engagement with said bolsters, and means for yieldingly resisting relative movement between said center sill and bolsters.

12. A device of the class described comprising a body portion having side sills, end sills, and two or more transverse members engaging said side sills, certain of said transverse members constituting body bolsters, a load supporting center sill mounted for longitudinal movement relative to a plurality of said transverse members, means for yieldingly resisting relative movement of said center sill, and coupler means yieldingly secured to said center sill, the latter constituting a rigid draft and buffing member.

13. In a railway car, the combination with a plurality of transverse members including a bolster, of a long travel center draft member mounted for movement relative to said

bolster and extending substantially the length of the car, and energy dissipating means secured to said bolster for resisting said relative movement and mounted in the horizontal plane of said bolster.

14. In a railway car, the combination with a plurality of transverse members including a bolster, of a long travel center draft member extending through the bolster and mounted for movement relative to said bolster and extending substantially the length of the car, energy dissipating means including a resilient member for resisting said relative movement, and means projecting laterally from the center member and adapted to engage said bolster for preventing said resilient member from going solid.

15. In a railway car, the combination with a plurality of transverse members including a bolster, of a center member mounted for longitudinal movement relative to said bolster, coupler means having lost motion connection with the opposite ends of said center member for providing limited and predetermined train slack, and energy dissipating means operatively secured to said bolster and center member for resisting said relative movement.

16. In a railway car, the combination of a plurality of supporting members including a bolster, a center member mounted for longitudinal movement relative to said bolster, yielding coupler means including couplers mounted in the horizontal plane of the center member and secured to each end of said center member, and energy dissipating means having operative engagement with the bolster and center member for resisting said relative movement, said center member being positioned in the horizontal plane of the bolster.

17. In a railway car, a plurality of transverse members, a long travel member adapted for longitudinal movement relative to said transverse members, and energy dissipating means operatively connected to one of said transverse members and said longitudinally movable member, and means rendering said energy dissipating means effective for draft and buffing, whereby relative movement of the longitudinally movable member is resisted.

18. A car structure comprising a plurality of bolsters, a long travel center member extending substantially the length of the structure and mounted for longitudinal movement relative to said bolsters, coupler means movably secured to the center member for securing train slack, and energy dissipating means operatively connected to said bolsters and center member for resisting said relative movement, the movement of the coupler means relative to the center member being more limited than the movement of the center member relative to said bolsters.

19. In a device of the class described, a plurality of transverse members including a pair of body bolsters, a center draft member extending between said bolsters and mounted for longitudinal movement relative to said bolsters, and means of long travel including a resilient member and an element having frictional engagement with one of said bolsters for dissipating energy tending to produce said relative movement, said friction element being maintained in engagement with the bolster by said resilient member.

20. In a railway car, the combination of a plurality of supporting members including a bolster, a center member extending the length of the car and mounted for movement relative to said bolster, yielding coupler mechanism secured to said center member, and means including spring-pressed elements having frictional engagement with the bolster for resisting said relative movement.

21. In a railway car, a plurality of transverse members, a longitudinal draft member extending substantially the length of the car and adapted for longitudinal movement relative to said transverse members and extending through the transverse members, friction means within one of the transverse members for resisting relative movement between said longitudinal member and said transverse members, and means for releasing said friction means in the event of sticking of the same.

22. A railway car comprising a plurality of transverse members, a rigid member extending substantially the length of the car and adapted for longitudinal movement relative to said transverse members, couplers, yielding means for securing the couplers to said longitudinally movable member, yielding means for resisting relative movement between the transverse members and said longitudinally movable member, and means for preventing said last-named yielding means from going solid, the capacity of the first named yielding means being materially less than that of the second named yielding means.

23. In a railway car, transverse members including a bolster, a center member extending substantially the length of the car and adapted for longitudinal movement relative to said bolsters, resilient means interposed between one of said bolsters and center member, friction means having operative engagement with one of said bolters and center member, means operatively associated with said center member for rendering said resilient and friction means operative to resist relative movement of the center member under draft and buffing and means adjacent the other of said bolsters for releasing said friction means in the event of sticking of the same.

24. A railway car comprising a plurality of transverse members including a bolster, a

center member adapted for longitudinal movement relative to said bolster, couplers associated with said center member, yielding means interposed between the couplers and center member for normally maintaining the couplers in a predetermined position relative to the center member, yielding means interposed between the bolster and the center member for absorbing the inertia of the car body, said last-named yielding means having a travel materially greater than the travel of said first-named yielding means, and means for rendering said last-mentioned yielding means effective for draft and buffing.

25. A railway car comprising a plurality of transverse members, a member adapted for longitudinal movement relative to said transverse members, a coupler, yielding means for securing the coupler to said longitudinally movable member, yielding means for resisting relative movement between the transverse members and said longitudinally movable member, the travel of said second-named yielding means being greater than the travel of the first-named yielding means, and means for preventing said second-named yielding means from going solid.

26. In a railway car, a plurality of transverse members including a bolster, a long travel center member extending substantially the length of the car and mounted for longitudinal movement relative to said bolster, and means including one or more friction elements located in the plane of said bolster for resisting said relative movement.

27. In a railway car, a plurality of supporting members including a bolster, a long travel center sill mounted for movement relative to said bolster, and energy absorbing mechanism including friction means for resisting said relative movement, said friction means being located in the horizontal plane of said bolster.

28. In a railway car, a plurality of supporting members including a bolster, a long travel center sill mounted for movement relative to said bolster, and mechanism including friction means housed in said center sill for resisting said relative movement.

29. A railway car comprising a body structure, means adapted for longitudinal movement relative to said body structure and extending substantially the length of the latter, coupler means operatively associated with said means, yielding means of limited travel interposed between the coupler means and the first named means, yielding means for resisting relative movement between the body structure and said first-named means, and means for preventing said last-named yielding means from going solid.

30. A railway car provided with relatively movable elements of long travel including a center draft member extending substantially the length of the car, means for yieldingly resisting said movement, and coupler means having a predetermined travel under all normal operating conditions movably secured to said draft member for providing train slack.

31. In a railway car structure the combination, with a long travel center member, of a coupler, and means including a resilient member operatively secured to said coupler and center member for providing an invariable amount of train slack under normal operating conditions.

32. A car structure including bolsters, a long travel center member mounted for movement relative to said bolsters, resilient means for yieldingly resisting relative movement of the center member, cross-bearers intermediate the bolsters for guiding said center member and train slack means operatively connected to said center member, the ratio of movement of the center member relative to the movement of said last named means being large.

33. In a railway car structure, a long travel draft member mounted for relative longitudinal movement, means including resilient members for yieldingly resisting said longitudinal movement whereby excessive forces imparted to the draft member are gradually resisted without damage to the structure, and means for securing reduced train slack.

34. In a railway car structure, a draft member mounted for relative longitudinal movement of large extent, extending substantially the length of such structure and resilient means for resisting said longitudinal movement whereby excessive longitudinal forces imparted to the member are gradually resisted without damage to the structure.

35. In a car structure, a plurality of transverse members including a bolster, a longitudinal center member, coupler members secured to said center member for a predetermined relative movement which determines the train slack, said center member being mounted for a relatively long movement with respect to said bolster, and means for yieldingly resisting the relative movement of said center member.

36. In a railway car structure, a center member mounted for relative longitudinal movement of large extent, resilient members for yieldingly resisting said longitudinal movement whereby forces imparted to the center member are gradually resisted without damage to the structure, and means operatively connected to the center member including a resilient member of less travel than the center member for securing a predetermined amount of train slack.

37. A railway car structure comprising a pair of bolsters, draft and buffing means operatively carried by said bolsters including a longitudinal center member mounted for large longitudinal movement relative to the

bolsters, train slack means operatively connected to said structure, the movement of said center member being large relative to the train slack, and yielding means for resisting relative movement of the center member.

38. In a railway car structure, a long travel draft member mounted for longitudinal movement relative to said structure, resilient means for yieldingly resisting said longitudinal movement whereby excessive forces imparted to the center member are gradually resisted without damage to the structure, and means mounted for movement relative to said structure for securing train slack, the movement of said last named means being more limited than the movement of said center member.

39. A railway car structure comprising transverse supporting members, draft means operatively carried by said members including a longitudinal center member mounted for large longitudinal movement relative to said supporting members, and coupler means having lost motion connection with said center member, the large movement of the center member being secured without any increase in the train slack, and yielding means for resisting relative movement of the center member.

40. A railway car structure comprising a draft member extending substantially the length of the structure and mounted for movement relative thereto, train slack means including couplers secured to the opposite ends of said draft member, said means being adapted to positively prevent movement of the couplers outwardly relative to said draft member and adapted to permit limited movement of the couplers inwardly relative to said draft member, and means for yieldingly resisting movement of said draft member relative to said structure.

41. A railway car structure comprising, in combination with a bolster having an opening therein, flooring carried by said structure and supported by said bolster, a center member extending through said opening and mounted for movement relative to said bolster, means for yieldingly resisting said relative movement, and stringers secured to the flooring and having frictional engagement with said center member for dissipating a portion of the energy tending to produce said relative movement.

42. In a car structure, a draft and buffing member extending substantially the length of said structure and mounted for movement relative thereto, said member comprising two substantially parallel rolled beams, means constituting tie plates secured to said beams intermediate the ends of the same, striking plates secured to the ends of said beams, and couplers movably secured to said striking plates in the horizontal plane of the draft and buffing member.

43. In a railway car, a body structure including bolsters, a rigid draft member extending substantially the length of the structure and mounted for movement relative thereto, couplers having lost motion connection with the draft member for providing train slack, means for yieldingly resisting movement of the couplers relative to the draft member, and means for yieldingly resisting movement of the draft member relative to the car structure, the movement of the draft member relative to the car structure being greater than the movement of one of the couplers relative to said draft member.

44. A railway car structure comprising body bolsters having openings therethrough, a draft and buffing member constituted by a plurality of substantially parallel rolled beams extending substantially the length of said structure and mounted for movement in both directions relative to the body structure, said draft and buffing member extending through the openings in said bolsters, yielding means for resisting relative movement of said draft and buffing member, couplers for the opposite ends of the draft and buffing member, means for movably connecting the couplers to the draft and buffing member, and yielding means for resisting movement of the couplers relative to the draft and buffing member, said first named yielding means being adapted to absorb substantially all of a draft or buffing force imparted to the couplers and having a travel greater than the travel of the last named yielding means.

45. A railway car structure comprising body bolsters having openings therethrough, a draft and buffing member constituted by a plurality of substantially parallel beams extending substantially the length of said structure and mounted for movement in both directions relative to the structure, said draft and buffing member extending through the openings in said bolsters, yielding means positioned adjacent one of said bolsters for resisting relative movement of said draft and buffing member, said yielding means including one or more friction elements, yielding means adjacent the other of said bolsters for releasing said friction element or elements in the event of sticking of the same, couplers having lost motion connection with the opposite ends of the draft and buffing member, the movement of the couplers relative to the draft and buffing member determining the train slack, and yielding means for resisting movement of the couplers relative to the draft and buffing member.

46. In apparatus of the class described, a body structure having a pair of bolsters, a draft and buffing member extending substantially the length of said structure and mounted

for movement relative thereto, relatively stiff yielding means for resisting relative movement of said member whereby draft and buffing forces are resisted, couplers operatively and movably connected to the opposite ends of said draft and buffing member, and relatively light yielding means for resisting movement of said couplers relative to said draft and buffing member, the second named yielding means being yieldable in operation to permit a maximum movement of the couplers relative to the center member prior to any movement of the center member relative to the body structure.

In testimony whereof I have signed this specification.

OTHO C. DURYEA.